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(54) Vehicle seat with adjustable back rest

(57) A vehicle seat has a seat base 11 for attachment to the vehicle structure. The seat has a sitting portion 14 and a back rest 1 which is divided into upper and lower sections 1 and 10 respectively. The upper section is attached to the lower so that it can move up and down with respect to it, and so is adjustable to suit the height of the occupant. The seat also has an integral seat belt 7 attached to an anchor point 8 on the upper section and passes through a ring on a strap 4 attached to the upper part of the seat back. The upper section 1 is spring urged upwardly, but when the seat belt is fastened to the buckle latch 12 on the lower part of the seat, the upper part of the back rest is drawn down to the required level. It may also be locked to the lower section at the lower level by a locking device 9. The seat may also incorporate a head restraint 2, and may also be adapted to include a child seating/restraint attachment, not shown.

FIGURE 1

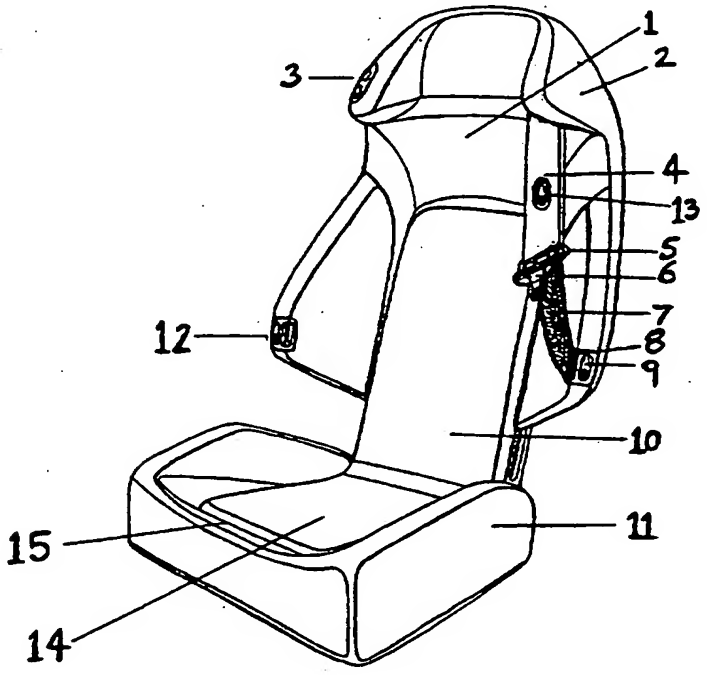

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FIGURE 1

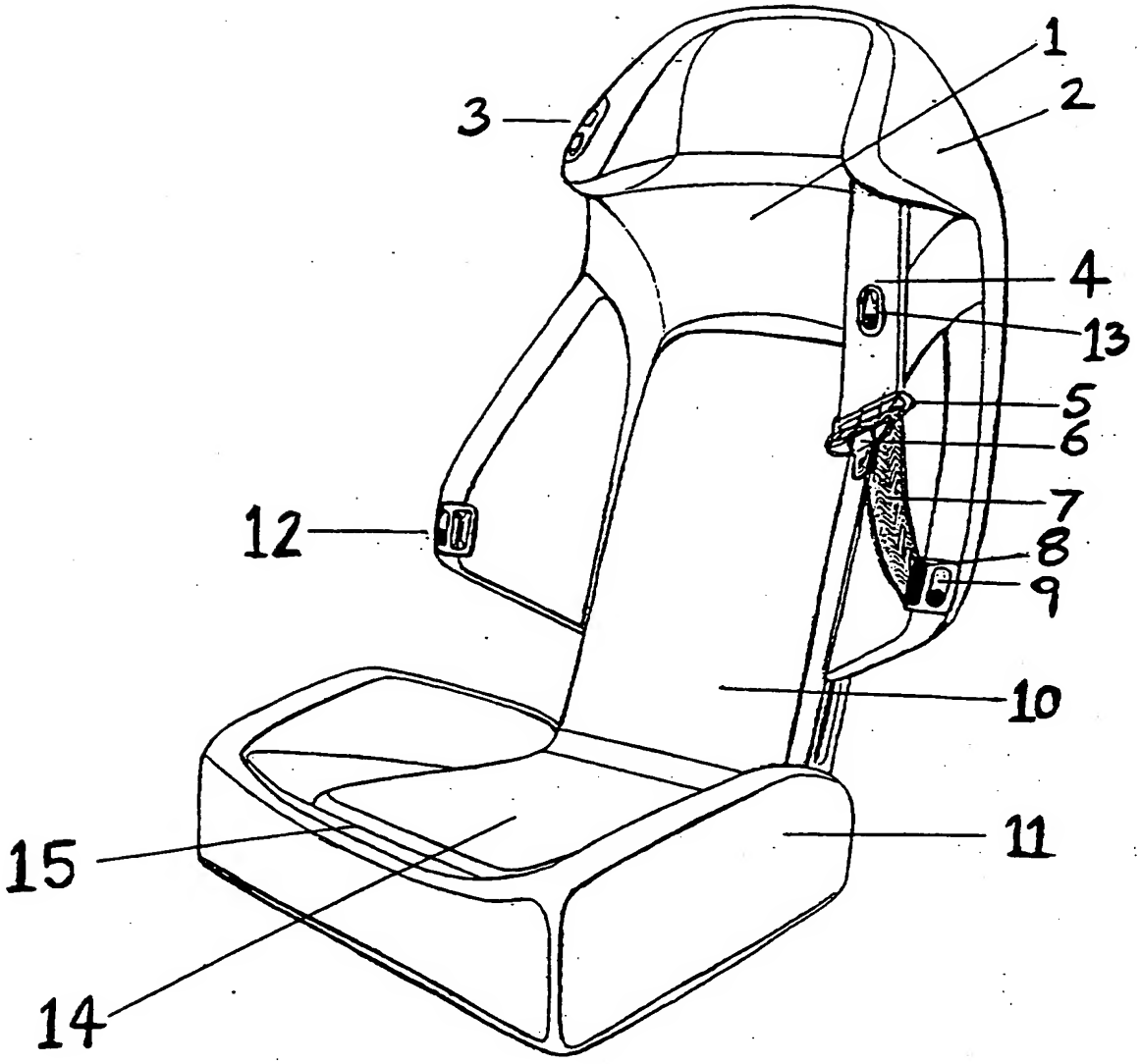


FIGURE 2

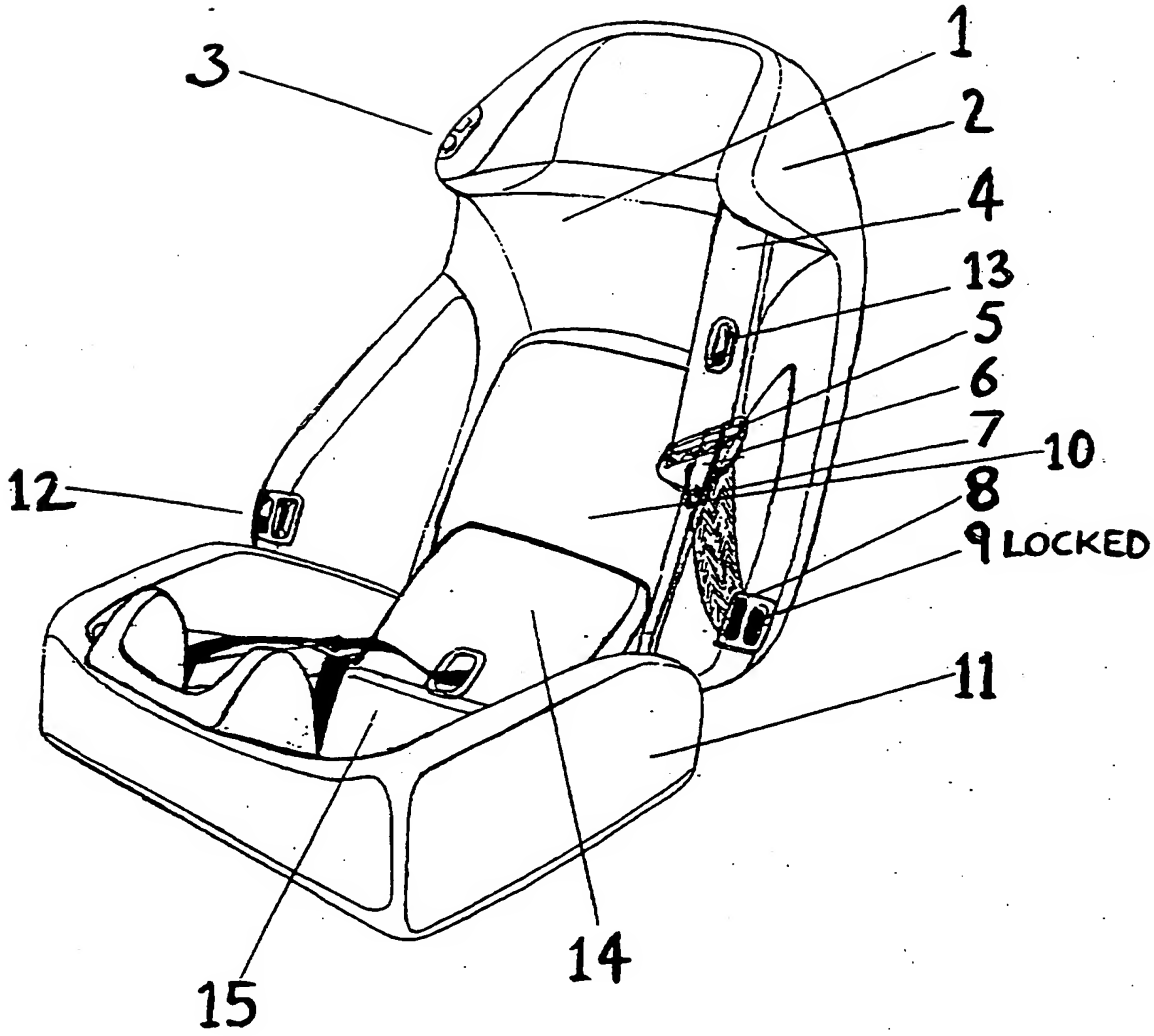


FIGURE 3

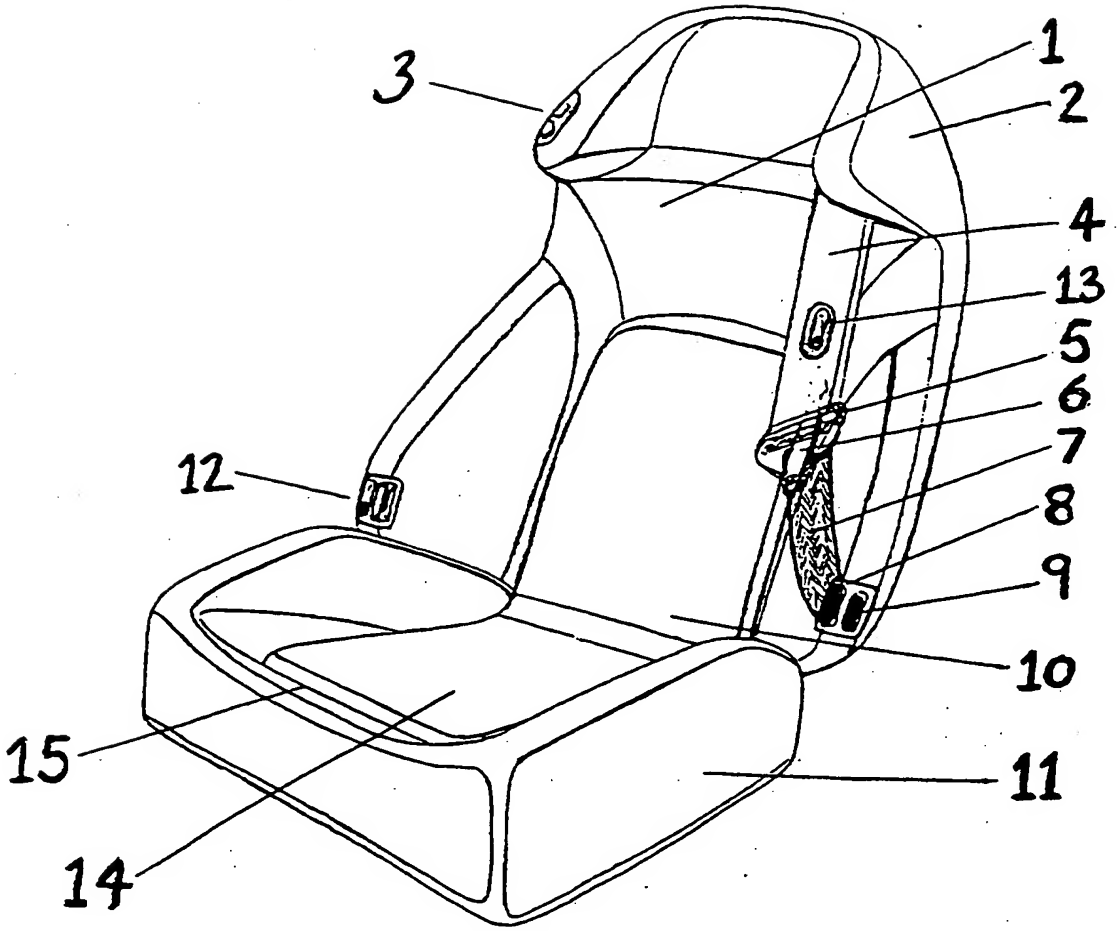
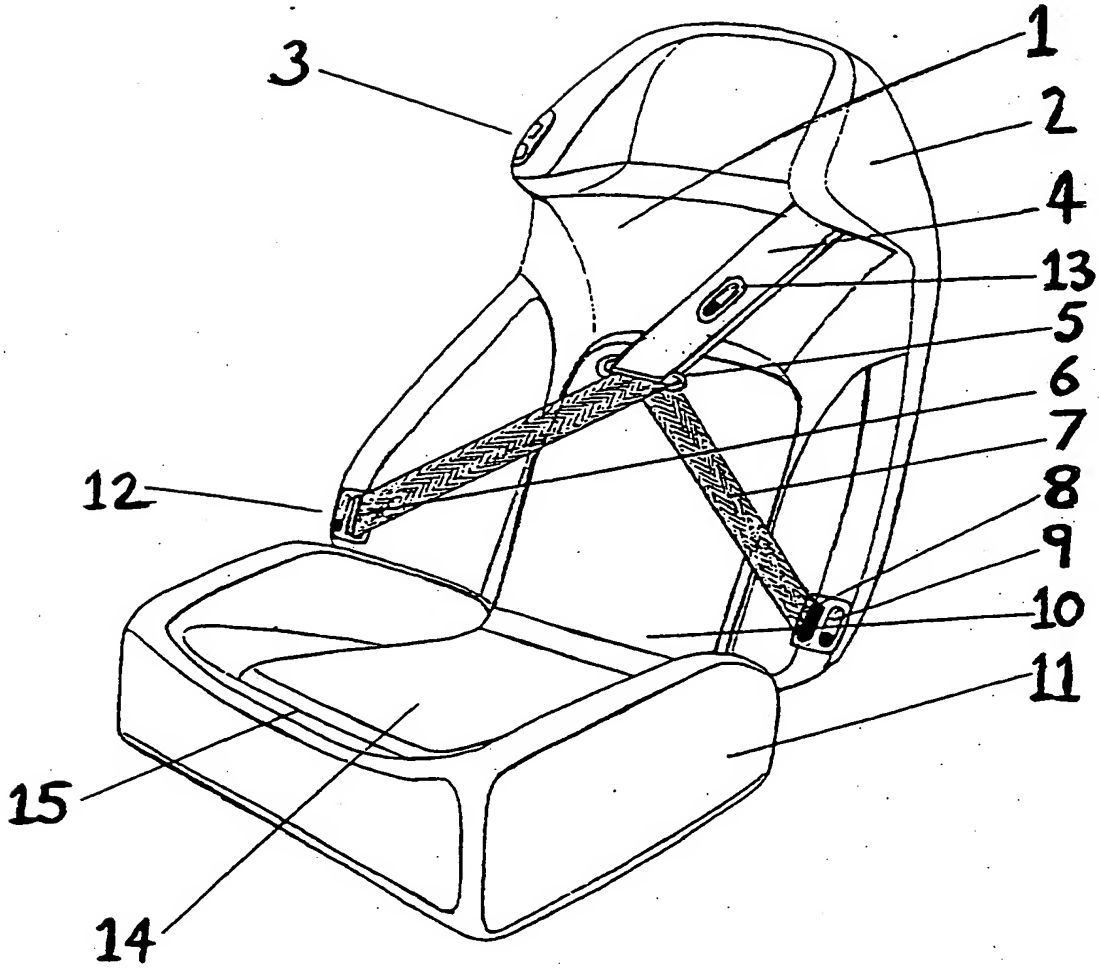


FIGURE 4



ADJUSTING SEAT

This invention relates to an adjusting seat.

Seats fitted to vehicles which comprise a seat base, a backrest and sometimes a headrest are well known as having the facility to be movably attached to the vehicle to which they are applied, and which have a restraint system adjacently fitted to the vehicle for the use of the occupant who is using the seat. There is a special type of seat which has a restraint system fitted to the seat itself with the intent of making usage easier and safer for the occupant. And either type has a variety of adjustment facilities provided, and the possibility is there to add when required accessories which may make the seat safer for younger and or shorter occupants, or infants.

These seats are, however relatively cumbersome with these accessories fitted and require constant adjustment, removal, and re-fitting when another occupant is using the seat, and in many cases the outcome of these temporary additions and modifications can be unsafe and or uncomfortable for the user; also these seats do not facilitate rapid removal of the occupant in their seat in the event of a serious accident.

According to one specific embodiment of the present invention there is provided a seat base to the rear of which is a lower backrest portion upon which the occupant may lean their back, the attachment of the lower backrest portion may be 'hingeable', in other words the lower backrest may 'lean' on the hinge and be free to hinge forward of the set rake (lean) of the seat; another upper backrest portion is movably attached for movement (soley towards or away from the rear of the seat base) which may also comprise a headrest which may have side padding, and the lower part of this upper backrest portion may have side padding to prevent sideways movement of the occupant whilst in the seat.

Specifically the seat may also comprise a restraint system; which according to the present invention may be solely attached to the seat; the upper backrest portion runs in parallel with the lower backrest portion; the two together working as a whole. This movability of the upper backrest portion facilitates adjustment of the height of the backrest according to the height of the occupant.

According to the present invention the occupant may be restrained solely by the seat and its restraint system, the seat being attached by some part to the vehicle to which it is applied.

Specifically the restraint system may consist of an upper strap consisting of non-stretch material; which emerges from and is attached or movably attached above the left or right shoulder, close to the headrest, or emerges from the side padding of the headrest, the upper strap having a closed loop which may be constructed of a rigid material; attached to its lower end.

According to the present invention the upper strap may be padded for comfort and impact absorption.

According to another aspect of the present invention a belt may be fitted to the upper backrest, or to the lower backrest, or to the seat base which would emerge substantially below and slightly outward of the upper strap, this belt may consist of a non-stretch material which may be contained within a sprung drum which may be located within the adjusting seat, and then emerges below the upper strap.

According to the present invention the belt may be permanently fed through the closed loop attached to the lower end of the upper strap in such a way that it may slide freely through the loop; on the end of the belt may be attached a metal clip, which in use may be inserted into a clip locking device which may hold the clip in place which would be located opposite the point where the belt origonally emerged (if the belt origonally emerged below the left shoulder then the clip locking device would be located vertically below the right shoulder).

According to the present invention the clip locking device which the clip may be inserted into while the seat is occupied has three main functions:

Firstly to secure the clip (and belt around the front of the occupant) and thus keep the occupant in their seat until such a time as the clip locking device is released, freeing the clip;

Secondly to have the action of locking the upper backrest portion at whatever height it is at when the clip is inserted into the clip locking device, by way of a device which may be activated by the insertion of the clip into its clip locking device, this second device locks the upper backrest portion and prevents it from moving substantially upward or downward on its movable attachment; which may take the form of one or more runners or sliding devices; and which create the movable attachment of the one portion of the backrest to the other portion of the backrest, and to maintain its locking action until such a time that the clip locking device is released;

Thirdly to have the action of locking the belt and to prevent it from spooling out substantially further (preventing an increase in the length of the emerged belt) than the length it is at when the clip is inserted into its locking device. This may be done by way of a third device which once activated (by the clip on the belt being inserted into its locking device) locks the drum and prevents substantial unwinding of the belt, until such a time that the clip locking device is released.

According to the present invention the movable attachment of the upper backrest portion may be sprung in such a way that when it is not locked, it may rise up to its maximum travel away from the seat base, thus having the effect that when the seat is about to be occupied, or about to be left by the occupant it is as unrestrictive to the occupant as possible.

According to the present invention the belt which prevents the occupant from moving forwards and downwards which runs across the front of the torso and under the occupants arms in normal use may be complemented by way of the height of the base of the seat being substantially higher at the front than at the back; nearest to the backrest, the effect of this would be to prevent the lower torso and limbs of the occupant from sliding down and forwards underneath the belt.

According to another particularly important aspect of the present invention the occupant is unable to slip or otherwise move substantially whilst secured in the seat, as a result of this there may be an occasional requirement for the occupant to be able to reach forwards whilst still being safely secured in their seat; and may be facilitated by way of an inertia lock hinge, at the base of the lower backrest portion; this hinge may work on the same axis as any other hinges which may be fitted for example to allow lean (rake) adjustment.

Specifically according to the present invention this inertia lock hinge may allow the occupant when required to lean forwards (the seat leaning forwards with them) by pulling forwards on the belt, resulting in the backrest and the occupant both leaning forwards; with the effect of keeping the occupant firmly restrained by the seat and belt.
however, in the event of the seat being subjected to violent forward deceleration, the inertia lock on the inertia hinge may lock the seat at the angle of lean it was at when the deceleration took place until such a time that the inertia ceases. However, according to another aspect of the present invention, the inertia lock on the hinge may not prevent the backrest as a whole from freely leaning back to the origonal angle it was at prior to having leaned forwards; this facility may be used to prevent the occupant from being injured by external restraint systems fitted to the vehicle itself. In accordance with this there may be fitted a second hinge locking device which may take the form of a centrifugal lock; which should the hinge rotate rapidly forwards, may be engaged and lock the hinge until the inertia ceases. This centrifugal hinge may allow free movement of the backrest rearwards as in the inertia lock hinge.

According to another important and convenient aspect of the present invention, the adjusting seat may be fitted with a lock off device which may have an engage and release lever or switch which when engaged may have the effect of fixing the upper backrest portion at any chosen height and which when engaged may lock the running device or similar which facilitates the movability of the upper backrest portion towards or away from the seat base without the necessity of placing the belt clip into its clip locking device.

this lock off device may also have the effect of locking the lean (rake) of the backrest at any chosen angle; when engaged this lock off device may override the inertia lock hinge at the base of the backrest; the overall effect of this may be to allow the adjusting seat to be fixed at a chosen angle and height, by engaging the lock off, either for making the adjusting seat compact when not in use, or when it may not be convenient for the backrest to lean forward while in use perhaps when the occupant wishes to sleep, or when a younger occupant is using the adjusting seat.

Specifically this lock off may be intended for use when a younger occupant is using the adjusting seat, also it may be specifically used when the driver of the vehicle would benefit from the increased visibility created by the passenger adjusting seats being as low in the vehicle as possible; also the engage lever may have a rollover switch which may automatically engage the lock off should the seat be partially or wholly upturned.

According to the present invention, the lock off may be used simultaneously in conjunction with the clip locking device and its relevant ancilliaries, however, if it is engaged at the same time as the clip locking device is engaged; then at such a time that the clip locking device is released; then the lock off may be automatically released as well; in order to allow the upper backrest portion to raise up to its full height for the easy exit of the occupant. This may be facilitated by a remote device such as a sprung wire latch or similar system which may disengage the lock off whenever the clip is released. The lock off may also be disengaged by use of the lock off switch or lever.

According to the present invention the adjusting seat may be attached to the vehicle to which it is applied in such a way as to facilitate the rapid removal of the whole seat from the vehicle by way of the use of a small number of quick release grip-washered bolts or a system with a similar effect.

Also in accordance with the present invention the upholstery of the lower backrest portion may be attached to the lower backrest frame solely at the top and bottom and the upper backrest portion may have a raised horizontal section which runs up and down behind the upholstery of the lower backrest in order to change the shape of the backrest automatically whenever it is moved.

According to the present invention there may be fitted to the adjusting seat an infant seat which may be concealed until required and which consists of a standard infant restraint system.

A specific embodiment of the invention will now be described by way of example with reference to the accompanying drawing in which:-

Figure 1 shows the seat and its general appearance with the upper backrest portion fully extended and the belt unsecured;

Figure 2 illustrates the possible situation of the infant seat upon the seat;

Figure 3 shows the seat with the upper backrest portion fully compacted down to its lowest position with the lock off engaged;

Figure 4 shows the seat as it may appear with the restraint system in operation with the belt pulled across the seat and the clip in place in its locking device;

Refering to the drawing the seat may comprise a seat base 11. The lower backrest portion 10 may be attached to the seat base. The upper backrest portion 1 may be movably attached to it.

In order to use the seat the occupant should find the seat as it appears in figure 1 or figure 3 (in which case the occupant has to release the lock off) and sits on the seat base 11, leans their back on the lower backrest portion 10, pulls the upper strap 4 (which may have the upper strap adjust lever 13 attached to it) across and down in front of them; in doing this the upper backrest 1 moves down on its movable attachment until the side-pads 2 on the headrest are adjacent to the shoulders; then the occupant holds the clip 6 and pulls the belt 7 through the loop 5 which is attached to the upper strap; the belt extends from the point where it emerges 8 adjacent to the lock off switch 9; and the occupant then pulls the clip (and the attached belt) across and inserts it into the clip locking device 12 with its release lever. The seat should now have the appearance of figure 4. And if necessary the lock off may be engaged at this time.

In order to debark from the seat the occupant presses the release lever 12, as a result of which the lock off 9 disengages if it was in use; in doing this the backrest extends to its full height, and the clip (and belt) now released pull across the occupants torso and the belt contracts as far as it can back into the seat. The seat should now have the appearance of figure 1 again.

A map reading and courtesy light 3 may be fitted to the upper portion of the backrest.

In order to use the lock off 9 the user may push the upper backrest portion down if required and also if necessary hinge the backrest forwards and whilst holding the upper backrest portion down and or forwards engages the switch. The seat should now appear as in figure 3.

In order to release the backrest the user disengages the lock off as a result of which the upper backrest portion extends fully and the lean is no longer locked at the angle it was at when the lock off was engaged. The seat should now have the appearance of figure 1.

To utilise the infant seat the user lifts the lid of the seat base 14 and extends the infant seat 15, it is now ready for use. The seat should now have the appearance of figure 2.

In order to re-stow the infant seat the user simply reverses the proceedures outlined in the last paragraph.

CLAIMS

1 A seat intended for application to mobile vehicles comprising a seat base, and a backrest wherein the backrest has an upper and lower portion and an attachment of the upper portion of the backrest being movable beyond the lower portion of the backrest and a seatbelt extendable between the upper attachment and a lower anchor point whereby in use the attachment restrains a body in the seat against upward movement.

2 A seat as claimed in Claim 1, wherein the upper portion of the backrest is motivated in such a way as to make the backrest extend to its maximum height whenever it is not secured.

3 A seat as claimed in Claim 1, or Claim 2, wherein an upper strap member is fixed to the upper portion of the backrest, and which has means provided to feed a seatbelt through the lower end of the strap thereof.

4 A seat as claimed in in any one of Claims 1, or Claim 2, wherein an upper strap member is movably attached to the upper portion of the backrest, and which has means provided to feed a seatbelt through the lower end of the strap thereof.

5 A seat as claimed in Claim 3 or Claim 4 wherein a seatbelt is fed through the means in the upper strap.

6 A seat as claimed in any one of Claims 1,2, or Claim 5, wherein means are provided to attach the seatbelt to another anchor point on the seat.

7 An seat as claimed in any of Claims 1,2,5, or Claim 6, wherein means are provided which prevent further extension of the seatbelt once the means are activated.

8 A seat as claimed in any one of Claims 1,2,5,6, or Claim 7, wherein means are provided which prevent the upper backrest portion from extending or contracting on its attachment once the means are activated.

9 A seat as claimed in any one of Claims 1,2,5,6,7, or Claim 8, wherein means are provided which allow the backrest to pivot forwards and backwards as far as the lean (rake) of the backrest has been set; however, should the seat experience inertia then the means prevent substantial further pivoting of the backrest.

10 A seat as claimed in any one of Claims 1,2,5,6,7,8, or Claim 9, wherein means are provided which prevent substantial pivoting or extension or contraction of the upper backrest portion should the seat be wholly or partially upturned.

11 A seat as claimed in any one of Claims 1,2,5,6,7,8,9, or Claim 10, wherein means are provided which prevent substantial pivoting forwards or backwards of the backrest once the means are activated.

12 A seat as claimed in any one of Claims 1,2,3,5,6,7,8,9,10, or Claim 11, wherein means are provided to rapidly remove the seat from the application which it is attached to in an emergency.

13 A seat as claimed in any one of Claims 1,2,3,5,6,7,8,9,10, 11, or Claim 12, wherein included in some part of the seat are means to accommodate an infant body and which restrain the infant body.

14 A seat substantially as described herein with reference to Figures 1-4 of the accompanying drawings.

Amendments to the claims have been filed as follows

1 A seat intended for application to mobile vehicles comprising a seat base, and a backrest wherein the backrest has an upper and lower portion and an attachment of the upper portion of the backrest being movable beyond the lower portion of the backrest and a seatbelt extendable between the upper attachment and a lower anchor point whereby in use the attachment restrains a body in the seat against upward movement. The upper backrest portion is secured at a given height against upward and downward movement by the action of buckling up the seatbelt, manually or by motion sensitive means, and is released by the reversal of these actions.

2 A seat as claimed in Claim 1, wherein the upper portion of the backrest is motivated in such a way as to maximise the height of the backrest as a whole whenever it is not secured.

3 A seat as claimed in Claim 1, or Claim 2, wherein the upper attachment includes a strap member made of non stretching material, and which has a seatbelt attached to a lower anchor point and which is securely and movably fed through the lower end of the strap thereof.

4 A seat as claimed in Claim 1,2, or Claim 3, wherein means are provided which prevent further extension of the seatbelt once the means are activated either manually or by the action of buckling up the seatbelt, and are released by the reversal of these actions.

5 A seat as claimed in Claim 1,2,3, or Claim 4, wherein means are provided which allow the lower backrest portion (and the attached upper portion) to pivot forwards and backwards as far as the lean (rake) of the backrest has been set; however, should the means be manually applied or activated my motion sensitive means then the means prevent substantial further pivoting of the backrest, and are released by the reversal of these actions.

6 A seat as claimed in Claim 1,2,3,4, or Claim 5, wherein means are provided to rapidly remove the seat from the application to which it is attached to in an emergency.

7 A seat substantially as described herein with reference to Figures 1-4 of the accompanying drawings.

The Patent Office

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Application No: GB 9500076.6 **Examiner:** John Wilson
Claims searched: 1-14 **Date of search:** 14 March 1996

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): A3V[VRC]; A4L[LAV LBDB LBMD LC13]

Int Cl (Ed.6): B60N 2/00 2/02 2/22 2/26 2/30; B60R 22/00 22/26

Other: ----------

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
X,Y	GB2201087A	Daimler-Benz - whole document, and note p.1 ll.11-13	1 at least
Y	US4431233	Ernst - note the figs.	1 at least

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.